

TAXONOMIC TREATMENT OF *MONARDA* (LAMIACEAE) FOR TEXAS AND MEXICO

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ABSTRACT

A taxonomic treatment of *Monarda* for Texas and México is rendered. In Texas eighteen taxa in eleven species are recognized: *M. citriodora*, with two infraspecific categories, var. *citriodora*, and var. *parva*; *M. clinopodioides*; *M. fistulosa*, with two infraspecific categories, var. *menthifolia* and var. *mollis*; *M. fruticulosa*; *M. lindheimeri*; *M. maritima* (Cory) B.L. Turner, *comb. nov.*; *M. pectinata*; *M. punctata*, with five infraspecific categories, var. *correllii* B.L. Turner, *var. nov.*, var. *intermedia*, var. *lasiodonta*, var. *occidentalis*, and var. *punctata*; *M. russeliana*; *M. stanfieldii*; and *M. viridissima*. In México nine taxa in seven species are recognized: *M. bartlettii* (including *M. dressleri* and *M. malloryi*); *M. citriodora*, with two infraspecific categories, var. *aus-tromontana* (Epling) B.L. Turner, *comb. nov.* (including *M. mexicana*) and var. *citriodora* (including var. *attenuata*); *M. eplingiana*; *M. fistulosa*; *M. pectinata*; *M. pringlei*; and *M. punctata*, with two infraspecific categories, var. *correllii* and var. *occidentalis*. A key to the taxa of both regions is presented, along with relevant synonymy, and distributional maps for the species concerned.

KEY WORDS: Lamiaceae, *Monarda*, Texas, México

A forthcoming treatment of the Lamiaceae of Texas has prompted the present paper. One might think that the genus *Monarda*, which is an abundant roadside weed over most of Texas, would have been adequately studied taxonomically, especially since two inclusive systematic treatments of the genus by well-trained workers have appeared within the last 55 years (McClintock & Epling 1942; Scora 1967). The presentation by McClintock & Epling was produced from only a smattering of collections from Texas and México, and was mostly accomplished without field work. The study by Scora largely followed

the nomenclature of McClintock & Epling but did include a summer or two of field work and some experimental studies. Nevertheless, neither of these taxonomic treatments are fully acceptable to me, largely because their biological concepts as to what a species or infraspecific category might be is at variance with mine, which I have opined upon in more detail elsewhere (Turner 1994).

This present study is based upon the examination of a large suite of specimens at LL, TEX (over 2,000 sheets), supplemented by the loan of selected specimens from the following institutions (BH, CAS, NY, UC, US). The distributional maps (Figures 1-7) are largely based upon these specimens, all of which have been annotated and are easily available to workers who might wish to question this or that occurrence.

Key to Texas species of *Monarda*

1. Flower clusters single and terminal (very rarely two); stamens exerted beyond upper lip. (2)
1. Flower clusters two or more, both axillary and terminal (rarely 1 on depauperate plants); stamens not exerted. (5)
 2. Corollas white to pale pink, the lower lips markedly red-spotted; mid-stem leaves with petioles mostly 1-3 mm long; plants of border areas of northeastern Texas. 12. *M. russeliana*
 2. Corollas white to pale lavender, the lower lips not markedly red-spotted; midstem leaves with petioles 3 mm long or more. (3)
3. Corollas deep pink to lavender; trans-Pecos Texas.
..... 5a. *M. fistulosa* (var. *menthifolia*)
3. Corollas white to pale pink to pale lavender; eastern Texas. (4)
 4. Corollas white; midstem leaves with petioles mostly 3-7 mm long, or if somewhat longer then to some extent pilose with spreading hairs.
..... 7. *M. lindheimeri*
 4. Corollas pale pink to pale lavender; midstem leaves with petioles mostly 8 mm long or more, never pilose with spreading hairs.
..... 5b. *M. fistulosa* (var. *mollis*)
5. Leaves linear, mostly 1-3 mm wide, densely and evenly minutely appressed-strigose throughout, the foliage ashy-white; southernmost Texas.
..... 6. *M. fruticulosa*
5. Leaves variously lanceolate, mostly 4 mm wide or more, variously pubescent but not as described in the above. (6)

6. Suffruticose sprawling shrublets or shrubs to 1 m high; stems with spreading pilose hairs 1-2 mm long; southernmost coastal Texas (Kleberg to Refugio counties). 8. *M. maritima*
6. Annual or stiffly erect perennial herbs, never shrublets or shrubs; stems w/o pilose hairs 1-2 mm long. (7)
7. Leaves (of primary stems) linear-lanceolate, mostly 4-6 mm wide; stems with vestiture of short hairs spreading at right angles to stem (rarely downcurved); mostly Carrizo sands of southcentral Texas. 14. *M. viridissima*
7. Leaves lanceolate-ovate to ovate, mostly 7 mm wide or more; stems with vestiture various, mostly down-curved but not as described in the above; widespread. (8)
8. Calyx lobes variously deltoid, 1-3 times as long as wide. (9)
8. Calyx lobes narrowly subulate or attenuate to awned, (3-)5-10 times as long as wide (including awns). (10)
9. Calyx mouth manifestly closed by a dense mass of white hairs arising at its orifice; tube of corolla glabrous; central mineral region of Texas and closely adjacent areas in granite or sandy soils, mostly along the Colorado River or its tributaries. 13. *M. stanfieldii*
9. Calyx mouth not as described in the above, the orifice merely ciliate; tube of corolla pubescent; widespread. 11. *M. punctata*
10. Bracts of floral clusters mostly elliptical to oblanceolate, abruptly narrowed into a bristle-tip. 2. *M. citriodora*
10. Bracts of floral clusters lanceolate, gradually tapering into a terminal bristle. (11)
11. Bracts and calyx lobes mostly purplish; corollas purplish; plants mostly 30-60 cm high. 3. *M. clinopodioides*
11. Bracts and calyx lobes mostly greenish; corollas yellowish to creamy white; plants mostly 20-40 cm high. 9. *M. pectinata*

Key to Mexican species of *Monarda*

1. Flower clusters terminal, nearly always 1 head to a stem. (2)
1. Flower clusters both terminal and axillary, nearly always 2 or more heads to a stem. (5)

2. Corollas red or purple-red. (3)
2. Corollas white, pink or pale lavender. 5. *M. fistulosa*
3. Calyx teeth mostly 1-2 mm long, 1-2 times as long as wide; northern Coahuila. 4. *M. eplingiana*
3. Calyx teeth mostly 2-4 mm long, 3-4 times as long as wide; Nuevo León and Tamaulipas, south to Veracruz. (4)
4. Corollas bright red; calyx teeth mostly (2.0-)2.5-3.5 mm long; mountains near Monterrey, Nuevo León. 10. *M. pringlei*
4. Corollas rosy-red to lavender-red; calyx teeth mostly 2.0-2.5 mm long; Gulf Coastal slopes of Sierra Madre Oriental from Tamaulipas to Veracruz. 1. *M. bartlettii*
5. Calyx lobes deltoid, 1-2 times as long as wide. 11. *M. punctata*
5. Calyx lobes narrowly subulate, or attenuate to awned, (3-)5-10 times as long as wide. (6)
6. Bracts of floral clusters mostly elliptical to oblanceolate, abruptly narrowed into a bristle-tip. 2. *M. citriodora*
6. Bracts of floral clusters lanceolate, gradually tapering into a terminal bristle. (7)
7. Plants mostly 20-40 cm high; corollas purplish. 2. *M. citriodora*
7. Plants mostly 30-60 cm high; corollas creamy-white to yellowish.
 9. *M. pectinata*

1. *MONARDA BARTLETTII* Standley, Field Mus. Publ. Bot. 17:208. 1937. TYPE: MEXICO. Tamaulipas: La Vagonia, vicinity of San José, 3200 ft, 5 Jul 1930, *H.H. Bartlett 10094* (HOLOTYPE: F!).

Monarda malloryi Gilly, Bull. Torrey Bot. Club 17:658. 1944. TYPE: MEXICO. Veracruz: near Piletas, 14 Jul 1943, *D. Dodds 105* (HOLOTYPE: NY!).

Monarda dressleri Scora, Madroño 18:199. 1965. TYPE: MEXICO. Tamaulipas: Mpio. Aldama, region of Rancho Las Yucas, ca. 40 km W of Aldama, 16 Jul 1957, *Dressler 1851* (HOLOTYPE: MEXU; Isotypes: MICH,UC!).

This taxon is exceedingly close to *Monarda pringlei* Fernald and might be reduced to varietal rank under the latter without much ado. It is retained at the species level following the studies of both McClintock & Epling (1942) and Scora (1967). The latter also retained both *M. malloryi* and *M. dressleri* on the basis of morphological minutia that I have been unable to affirm. The type of *M. bartlettii* differs from most collections of the species in northeastern México in having somewhat larger, more pubescent leaves.

2. *MONARDA CITRIODORA* Cerv. ex Lag., *Gen. Sp. Nov.* 2. 1816. TYPE: MEXICO. w/o locality [plants grown from seeds sent to Madrid in 1814 by Cervantes]. According to Epling (1942) "What are apparently authentic specimens, distributed by Pavon, are in ..." BM and G-DC. Epling notes (having examined these), that "The Pavon specimens are very similar to specimens from northeastern México, where perchance the original seeds were obtained by Cervantes or his colleagues at the time concerned" (LECTOTYPE [selected here]: BM!; Isolectotype: G-DC).

This is a widespread highly variable species as noted by McClintock & Epling (1942) and Scora (1967). The former workers recognized *Monarda citriodora*, *M. austromontana* Epling and *M. mexicana* Epling as good species, while Scora (1967) recognized only the latter as distinct, reducing *M. austromontana* to subspecific rank. I recognize only three varieties under the *M. citriodora* species-complex, as follows:

Key to varieties of *Monarda citriodora*

1. Apical portion of upper lip of corolla pubescent with inconspicuous appressed hairs mostly 0.1-0.5 mm long; Sierra Madre of western México and western U.S.A. var. *austromontana*
1. Apical portion of upper lip of corolla pubescent with few to numerous conspicuous long erect or spreading hairs 0.8-1.7 mm long; eastern México and adjacent U.S.A. (2)
 2. Calyx tubes mostly 5-7 mm long; corolla tubes 8-11 mm long; coastal region of southern Texas. var. *parva*
 2. Calyx tubes mostly 7-15 mm long; corolla tubes 11-18 mm long; widespread. var. *citriodora*

2a. *MONARDA CITRIODORA* Cerv. ex Lag. var. *CITRIODORA*

Monarda citriodora Cerv. ex Lag. subsp. *citriodora*.

Monarda aristata Nutt. (1837).

Monarda dispersa Small (1903).

Monarda tenuiaristata A. Gray ex Small (1903).

Monarda citriodora Cerv. ex Lag. var. *attenuata* Scora, Madroño 18:121. 1965. TYPE: MEXICO. Coahuila: near Musquiz, 1963, R.W. Scora 2340 (HOLOTYPE: MICH; Isotype: UCR).

The typical infraspecific element of *Monarda citriodora*, as indicated in the above account, is said to be typified by material at BM and G-DC, examined by Epling. The latter worker thought type material applied to the widely distributed taxon of eastern North America, Epling himself having proposed the more western taxon, var. *austromontana* (Epling) B.L. Turner (first as a species [Epling 1935], but subsequently reduced to a subspecies [Scora 1965]).

I can not recognize Scora's var. *attenuata*. He contends (1967) that "Variety *attenuata* is distinguishable by its horizontally spreading bracts, the nearly glabrous adaxial bract surfaces, green coloration, and more attenuate bract apices. The calyx lobes have a few or no lateral pili [long hairs] and the average corolla dimensions are larger than those of var. *citriodora*." All of these characters are exceedingly variable, both among the populations in northern México (numerous collections now on hand at LL, TEX, not examined by Scora), as well as among and within populations in the U.S.A. The only character called to the fore by Scora that appears to have any regional reliability is that of corolla size, for the populations in northern México do tend to have larger corollas (mainly more pronounced upper and lower lips) than do most collections from the U.S.A. However, exceptions to this generality abound within populations of both regions.

2b. *MONARDA CITRIODORA* Cerv. ex Lag. var. *AUSTROMONTANA* (Epling) B.L. Turner, *comb. nov.* BASIONYM: *Monarda austromontana* Epling, Madroño 3:29. 1935. *Monarda citriodora* Cerv. ex Lag. subsp. *austromontana* (Epling) Scora, Madroño 18:120. 1965. TYPE: MEXICO. Chihuahua: La Bufa Mountain, near Cusihuiriacich, 2 Sep 1887, C.G. Pringle 1955 (HOLOTYPE: US!; Isotypes: F!, US!).

Monarda mexicana Epling, Madroño 3:26. 1935. TYPE: MEXICO. Durango: w/o locality, w/o date, P.I. Garcia 999 (HOLOTYPE: US!).

This variety, like var. *citriodora*, is a relatively common, widely distributed, exceedingly variable taxon. It was largely distinguished from var. *citriodora* by its "lanceolate to linear-lanceolate" glomerular bracts which were said to be "not more than 4 mm wide", gradually acuminate apically, and strongly reflexed from the base. While this is true for most of the specimens examined by myself (for distribution cf. Figure 1), there are numerous exceptions to this generality, especially among recent collections from Durango along highway 40 between the cities of Durango and Mazatlán (but also elsewhere in the state of Chihuahua, LL-TEX). Not only are the bracts remarkably variable as to size, shape, indument, and color, there is also considerable variation as to the size and pubescence of calyx lobes. Indeed, I view *Monarda mexicana* to be a name bestowed upon forms of var. *austromontana* having somewhat triangular calyx lobes. For example, there is no doubt in my mind that Scora's citation of *Maysilles* 7771 (TEX,US) as belonging to his concept of *M. mexicana*, occurring along the Durango-Mazatlán highway, is but a collection of *M. c.* var. *austromontana* with reduced calyx lobes such as occurs on the type of *M. mexicana*. The plants concerned occur among a bevy of highly variable populations in this region, all with mostly elongate calyx lobes (and broad to narrow bracts) and are easily referable to Scora's subsp. *austromontana*. The exact locality in Durango of type material for *M. austromontana* is not known, but from my own experience with collections obtained by Mr. Garcia, this is likely to have been collected in the montane regions of northwesternmost Durango or possibly closely adjacent northern Sinaloa.

The var. *austromontana* was distinguished from var. *citriodora* by Scora largely because of its narrower glomerular bracts. I find glomerular bracts, especially in the former taxon, sufficiently variable so as to be unconvincing as diagnostic characters, as noted in the above account. The best character I found to distinguish between the two taxa is that of upper-lip pubescence of the corolla (as shown in my key), although, in general, var. *austromontana* is a smaller plant, having smaller glomerules and smaller bracts than var. *citriodora*. As can be seen by the distribution map of *M. citriodora* (Figure 1), its two large regional varieties are well separated, but characters which mark these do vary in peripheral populations, one toward the other, but not to any large extent, and one might say that the two varieties have achieved subspecific status, much as indicated by Scora.

2c. *MONARDA CITRIODORA* Cerv. ex Lag. var. *PARVA* Scora, Madroño 18:120. 1965. TYPE: U.S.A. Texas: San Patricio Co., near Sinton, C.M. Rowell 4977 (HOLOTYPE: WWF).

This name has been applied to localized populations along the Gulf Coastal regions of southern Texas (Figure 3) which mostly occur in heavy clay soils and

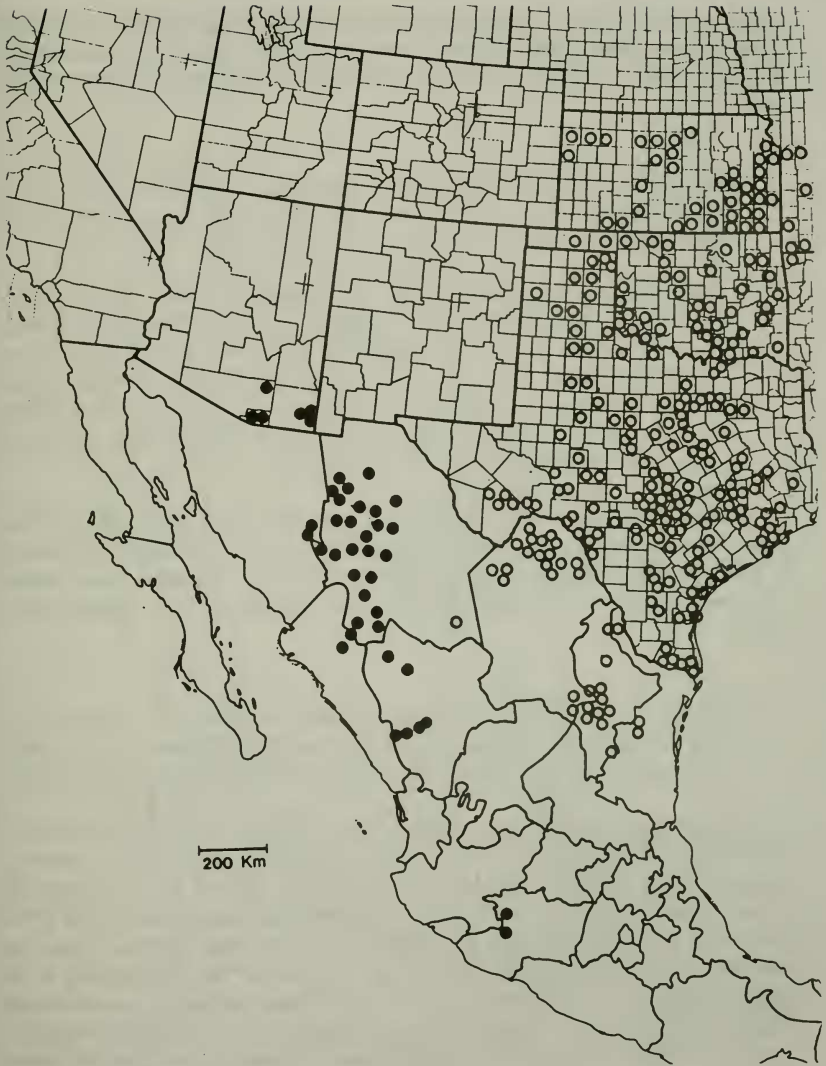


Figure 1. Distribution of *Monarda citriodora* var. *citriodora* (open circles); and var. *austromontana* (closed circles). Variety *parva* not shown, for which see Figure 3.

are apparently "fixed" in their genetic proclivity for the production of reduced flowers (Scora 1965). Such "forms" were first called to the fore by McClintock & Epling (1942, p. 192), as noted by Scora in his formalized description of the taxon.

3. *MONARDA CLINOPODIOIDES* A. Gray, *Syn. Fl. N. Amer.* 2:375. 1878.
 TYPE: U.S.A. Texas: Dallas Co., near Dallas, Jun 1874, *J. Reverchon* s.n. (LECTOTYPE [selected by Scora 1967]: GH).

Monarda aristata Hook., *Hook. Bot. Mag.*, pl. 3526. 1836. TYPE: U.S.A. Texas: described from plants grown in London, the seeds from southcentral Texas, probably from what is now Austin Co., 1833-1834, *T. Drummond* s.n. (HOLOTYPE: K). \equiv *Monarda citriodora* Cerv. ex Lag. var. *aristulata* A. Gray, *Proc. Amer. Acad. Arts* 8:369. 1873. (lacking a specimen at K, the plate represents adequate typification). Not *Monarda aristata* Nutt.

Monarda clinopodioides is similar to *M. pectinata* Nutt., but in Texas these have quite different distributions (Figure 3 and Figure 6), although McClintock & Epling (1942) cite two questionable specimens of the latter from central Texas which I take to be misidentifications or possibly, adventive weeds in this region.

4. *MONARDA EPLINGIANA* Standley, *Field Mus. Publ. Bot.* 17:208. 1937.
 TYPE: MEXICO. Coahuila: Del Carmen Mts., Vivas Canyon, 9000 ft, 26 Aug 1936, *E.G. Marsh, Jr.* 604 (HOLOTYPE: F!; Isotype: TEX!).

This taxon is closely related to *Monarda pringlei* and was treated as synonymous with the latter by McClintock & Epling (1942). Scora (1967), however, recognized the species, distinguishing it from *M. pringlei* by its supposedly thinner ovate to ovate-lanceolate (vs. lanceolate), long-petiolate leaves ("5-8 mm long" vs. "4-9 mm") and calyx lobes with glandular processes sessile or absent (vs. numerous and stalked). I find all of these "key" characters to be quite variable but can discern that *M. eplingiana*, confined to northcentral Coahuila (Figure 2), is perhaps worthy of recognition. The most consistent character I find to distinguish between these are those of the calyx, *M. eplingiana* possessing shorter, broader lobes (mostly 1.0-1.5 mm long vs. 2.5-3.5 mm long).

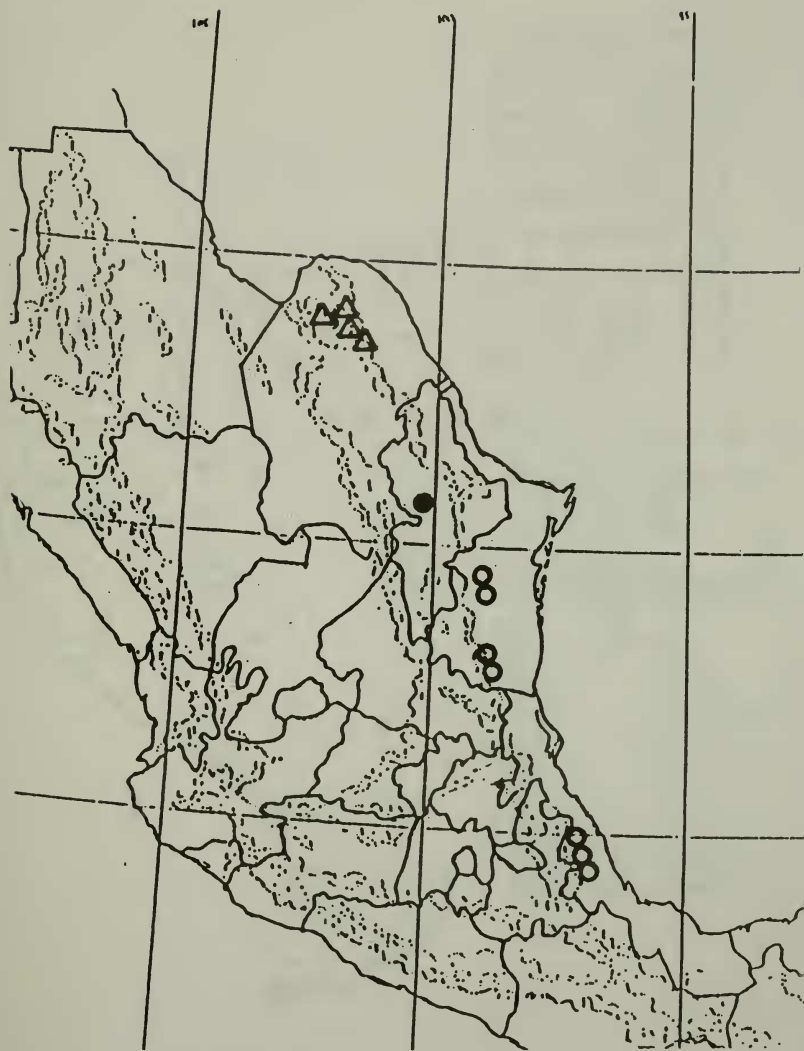


Figure 2. Distribution of *Monarda bartlettii* (open circles); *M. eplingiana* (open triangles); and *M. pringlei* (closed circle).

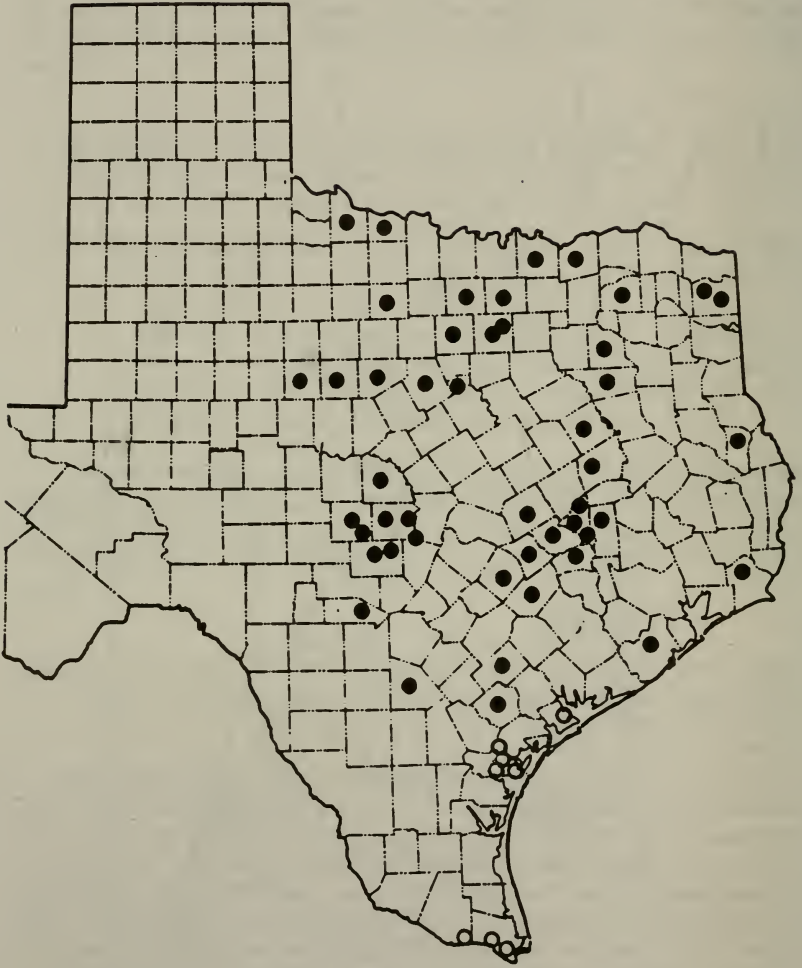


Figure 3. Distribution of *Monarda clinopodioides* (closed circles) in Texas; and *M. citriodora* var. *parva* (open circles).

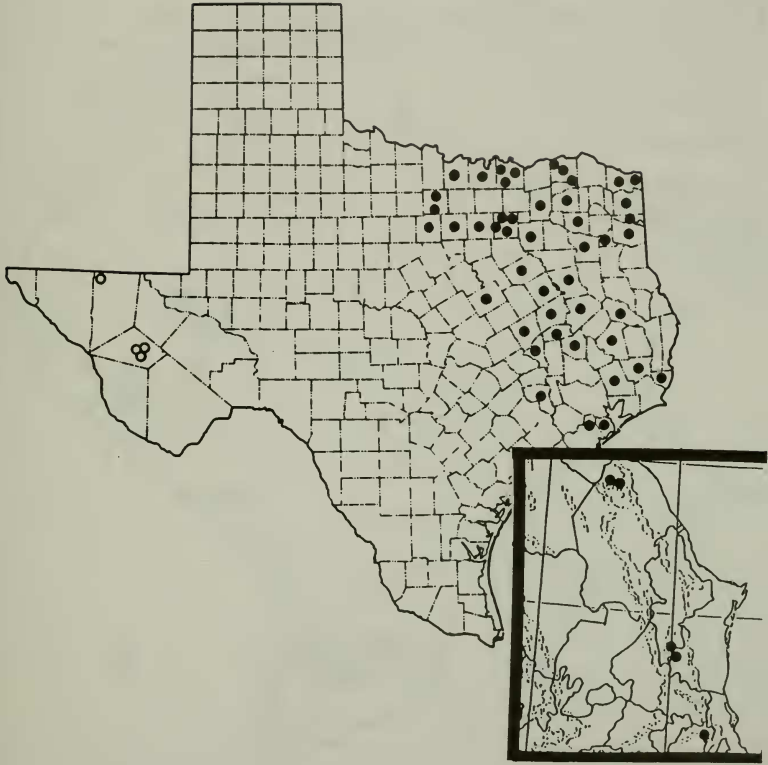


Figure 4. Distribution in Texas of *Monarda fistulosa* var. *menthifolia* (open circles), and var. *mollis* (closed circles); inset, var. *menthifolia* in México (closed circles).

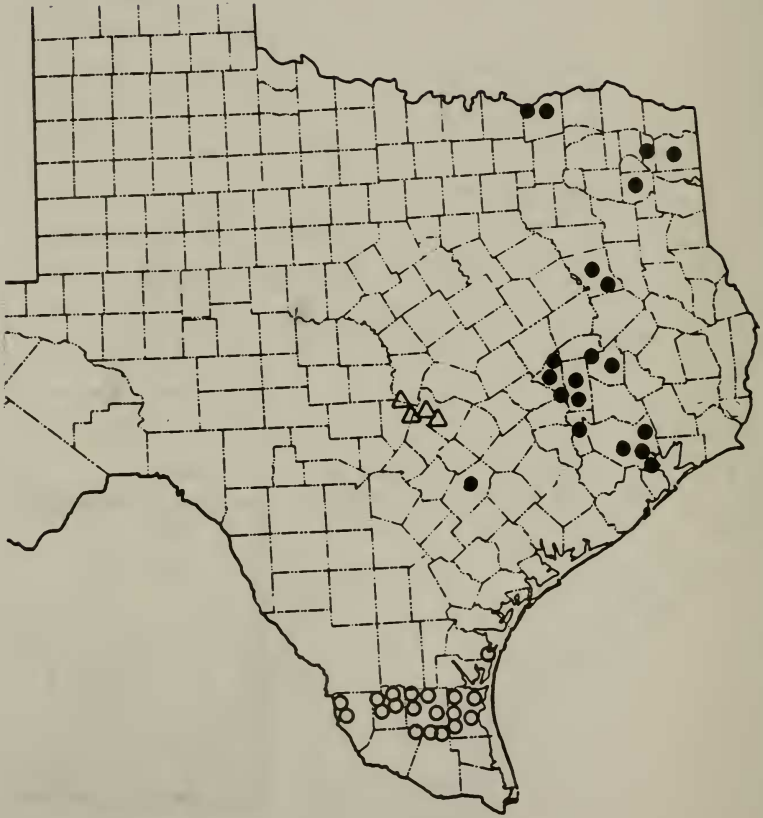


Figure 5. Distribution of *Monarda fruticulosa* (open circles); *M. lindheimeri* (closed circles); and *M. stanfieldii* (open triangles).



Figure 6. Distribution of *Monarda maritima* (open circles); *M. pectinata* (closed circles) in Texas; *M. russeliana* (closed triangles) in Texas; and *M. viridissima* (open triangles).

5. *MONARDA FISTULOSA* L., *Sp. Pl.* 1:22. 1753.

This is a widespread highly variable species of temperate North America. Several workers have recognized two or more regional varieties in the complex (e.g., Fernald 1950; McClintock & Epling 1942; Fosberg & Artz 1953). The var. *fistulosa* is thought to be largely confined to the upper New England states. Those taxa occurring in Texas and México are var. *mollis* (L.) Benth. and var. *menthifolia* (Graham) Fernald. Fosberg & Artz (1953) provided an adequate overview of the complex noting that var. *menthifolia* is distinguished from var. *mollis* by "its stiffer and mostly simpler . . . lower stems and shorter-petioled leaves, . . . into which it passes insensibly in the eastern part of the range." Following most workers, I also recognize but two regional varieties of *M. fistulosa* as occurring in Texas. These can be recognized by the following couplet:

1. Stems simple, rarely branched; midstem leaves with petioles mostly 2-8 mm long; trans-Pecos Texas and México. var. *menthifolia*
1. Stems tall and branched; midstem leaves with petioles mostly 8-30 mm long; eastern Texas and eastern U.S.A. var. *mollis*

5a. *MONARDA FISTULOSA* L. var. *MENTHIFOLIA* (Graham) Fernald, *Rhodora* 46:495. 1944. BASIONYM: *Monarda menthifolia* Graham, *Edin. New Phil. J.* 387. 1829. *Monarda fistulosa* L. subsp. *menthifolia* (Graham) L.S. Gill, *Caryologia* 30:787. 1984. TYPE: CANADA. Saskatchewan: "Norway House on the Saskatchewan River", 1825-1827, *Drummond s.n.* (HOLOTYPE: CL). Type material grown in Edinburgh, Scotland, from seed provided by Drummond (Epling 1942).

As indicated in the above, this is the westernmost variety of *Monarda fistulosa*. Epling (1942) treated the taxon at the specific level, but Scora (1967) accepted it as varietally distinct and largely confined to the western U.S.A. and Canada.

Scora does not report collections of this taxon from México, but I have examined the following: Coahuila: *Henrickson 11428, 11658* (LL); *Johnston et al. 11792A* (TEX). Nuevo León: *Hinton et al. 22142, 23204* (TEX). Tamaulipas: *McDonald 676.5* (TEX). Scora cited two collections of var. *mollis* from Hidalgo, México, which I have not examined, but I think these are better treated as var. *menthifolia*, to judge from other collections from this region (cf. Figure 4).

- 5b. *MONARDA FISTULOSA* L. var. *MOLLIS* (L.) Benth., *Lab. Gen Sp.* 317. 1933. BASIONYM: *Monarda mollis* L., *Amoen. Acad.* 3:399. 1756. TYPE: U.S.A. collection date and locality unknown, but probably from the southeastern states; described from material grown in the garden of Linnaeus (HOLOTYPE: LINN).

This taxon is relatively rare in easternmost Texas but is widespread in the eastern U.S.A. (*cf.* McClintock & Epling 1942, Figure 8). I surmise, based on McClintock & Epling's (1942) treatment and from my own examination of a wide set of specimens, that var. *mollis* will ultimately be subsumed under the var. *fistulosa*, there being little morphogeographical coherence of the characters used to distinguish between these.

6. *MONARDA FRUTICULOSA* Epling, *Madroño* 3:26. 1935. *Monarda punctata* L. var. *fruticulosa* (Epling) Scora, *Univ. Calif. Publ. Bot.* 41:46. 1967. TYPE: U.S.A. Texas: Duval Co., near Pena Station, Sep 1884, *Havard s.n.* (HOLOTYPE: US).

This is a well-marked shrub or shrublet to 1 m high, confined to south Texas (Figure 5) and readily recognized by its very narrow ashen leaves and markedly villous calyces. Scora (1967) gives little reason for its reduction to varietal status. McClintock & Epling (1942) retained the species, although they noted that "This proposed species may prove to be confluent with *M. p.* subsp. *immaculata* [= *M. punctata* var. *lasiodonta*]." I found no evidence that these two taxa might pass one into the other, nor did Scora provide any.

7. *MONARDA LINDHEIMERI* Engelm. & A. Gray, *Boston J. Nat. Hist.* 5:228. 1847. TYPE: U.S.A. Texas: Harris Co., near Houston, 1843, *F. Lindheimer 151* (HOLOTYPE: GH).

Monarda hirsutissima Small, *Fl. S.E. U.S.* 1037, 1903. TYPE: U.S.A. Texas: w/o collector or date (HOLOTYPE: Chapman Herbarium, NY!); McClintock & Epling (1942) thought it "highly probable" that the type sheet cited by Small was a Carpenter collection from Opelousas, Louisiana (PH), although Small gave the locality as Texas.

Monarda lindheimeri is closely related to *M. fistulosa*, but was maintained by both McClintock & Epling (1942) and Scora (1967). The latter worker noted that *M. lindheimeri* is "easily" distinguished from *M. fistulosa* var. *mollis* (with which it is sympatric, Figures 5 and 4) by its "lax and branched glomerules, by its sharp-angled stems with pigmented lines along the edges,

and by its shorter petioles and more ovate leaves". It is likely that the occasional hybrid between these two taxa occurs, as also suggested by Scora (1967).

8. *MONARDA MARITIMA* (Cory) B.L. Turner, *comb. nov.* BASIONYM: *Monarda punctata* L. var. *maritima* Cory, Field & Lab. 17:52. 1949. TYPE: U.S.A. Texas: San Patricio Co., 4 mi W of Aransas Pass, 14 Oct 1951, *F.B. Jones 648* (HOLOTYPE: SMU).

Shinners (1953) and Scora (1967) retained this well-marked taxon at the varietal level. I have no hesitation in recognizing its specific status, the taxon essentially confined to the deep sandy soils of southern Texas (Figure 6) and does not appear to intergrade with any of the several other *Monarda* taxa in this area, although the occasional hybrid between these might be expected.

9. *MONARDA PECTINATA* Nutt., J. Acad. Phil., ser. 2, 1:182. 1847. TYPE: U.S.A. New Mexico: Santa Fe Co., near Santa Fe, w/o date, *Gambel s.n.* (HOLOTYPE: K, according to McClintock & Epling 1942).

This is a widespread variable species of the short grass prairie regions of southcentral U.S.A. It might be confused with *Monarda citriodora* var. *citriodora*, but the latter is a more eastern plant, having larger glomerules, and more expanded, more abruptly contracted glomerular bracts. In Texas the occasional hybrid probably occurs between *M. pectinata* and *M. citriodora*, at least what appear to be putative hybrids (e.g., *Young s.n.*, 9 Sep 1918, TEX, so annotated by Epling) occur in trans-Pecos, Texas (Jeff Davis Mts.), where the two taxa occur together or within close proximity (*cf.* Figure 6 and Figure 1).

Monarda pectinata appears to be morphologically more or less intermediate between *M. citriodora* var. *austromontana* and *M. c.* var. *citriodora*. Indeed, I suspect that *M. pectinata* might be treated as an intergrading allopatric variety within the *M. citriodora* complex without much complaint from the field-oriented systematist, for it appears to intergrade with *M. citriodora* var. *austromontana* in northern México and closely adjacent areas of the U.S.A. This surmise is not addressed here because of time constraints and the need for detailed field work in the area concerned to test the surmise.

10. *MONARDA PRINGLEI* Fernald, Proc. Amer. Acad. Arts 36:501. 1901. TYPE: MEXICO. Nuevo León: near Monterrey, Jul 1888, *C.G. Pringle 2199* (HOLOTYPE: GH).

This attractive taxon is closely related to both *Monarda eplingiana* and *M. bartlettii* and all of these might be combined without much ado. *Monarda pringlei* is apparently confined to the higher more mesic montane sites in the vicinity of Monterrey, *M. eplingiana* to the more mesic sites of the Sierra Del Carmens of northern Coahuila, while *M. bartlettii* has a wider distribution, occurring at relatively low elevations in cloud forests along the front ranges of the Sierra Madre Oriental (Figure 2).

11. *MONARDA PUNCTATA* L., *Sp. Pl.* 1:22. 1753. TYPE: U.S.A. locality, collection date, and collector unknown (HOLOTYPE: L, according to Epling 1935).

This is a widespread variable species of the eastern portions of North America. McClintock & Epling (1942) treated the species as having eight subspecies, the typical subspecies largely confined to the Atlantic and Gulf Coastal regions of the U.S.A. Scora (1967) maintained all of these taxa, adding three additional ones, bringing to eleven the number of infraspecific taxa recognized. Scora treated all of these at the varietal level; nine of the eleven were said to occur in Texas. I have treated four of Scora's varieties as species (*M. fruticulosa*, *M. maritima*, *M. stanfieldii* Small, and *M. viridissima* Correll), believing these to be sympatric with *M. punctata* (s.l.), each occupying a restricted ecogeographic region and none showing intergradation with the various infraspecific taxa of *M. punctata*, although this is not to say that the occasional interspecific hybrid might not be found in regions of sympatry where this or that taxon occur together or in close proximity. Four of Scora's Texas varieties are recognized in addition to a fifth, var. *correllii*, newly described below. A key to these five varietal taxa follows.

Key to Texas and Mexican varieties of *Monarda punctata*

1. Calyx lobes with outer surfaces conspicuously pubescent with white spreading hairs 0.5-1.5 mm long. (3)
1. Calyx lobes with outer surfaces and margins minutely hispidulous, w/o spreading white hairs. (2)
 2. Leaves strongly nervate, the nerves with mostly erect or ascending hairs; calyx lobes narrowly deltoid; Texas Gulf Coastal grassland regions from Cameron County (and possibly coastal northeastern México) northwards. var. *punctata*
 2. Leaves weakly nervate, the nerves with appressed or incurved hairs, or glabrate, calyx lobes broadly deltoid; southcentral Texas and closely adjacent México in red sandy soils. var. *correllii*

3. Undersurfaces of leaves pubescent along the lower veins with erect or ascending hairs 0.3-1.0 mm long; eastern and southern Texas.
 var. *lasiodonta*
3. Undersurfaces of leaves pubescent with appressed or incurved hairs 0.1-0.2 mm long; northcentral and western Texas. (4)
 4. Calyx teeth narrowly acute, ca. 2 times as long as wide; northcentral Texas. var. *intermedia*
 4. Calyx teeth broadly acute, ca. as long as wide or nearly so; western Texas. var. *occidentalis*

11a. *MONARDA PUNCTATA* L. var. *PUNCTATA*

As indicated in the above account, this infraspecific taxon is confined to the Gulf Coastal regions of Texas and is readily recognized by its nonpilose narrowly deltoid calyx lobes and strongly nervate leaves. Inland it appears to grade into var. *correllii* B.L. Turner and var. *lasiodonta* A. Gray. Scora (1967) did not cite material of this taxon from Texas, apparently believing that its coastal distribution petered out in Louisiana, but I can not distinguish the Gulf Coastal material of Texas (Figure 7) from that of Louisiana and other Gulf states.

11b. *MONARDA PUNCTATA* L. var. *CORRELLII* B.L. Turner, var. nov. TYPE: U.S.A. Texas: Webb Co., red sandy soils along highway 83, 13 mi NW of Webb, 16 Jul 1957, D.S. Correll & I.M. Johnston 18109 (HOLOTYPE: LL!).

Monardae punctatae L. var. *punctatae* similis sed plantis robustioribus bracteis floralibus latioribus multo majoribusque dentibus calycis late deltoideis (1-2plo longioribus quam latioribus vs. 2-3plo) differt.

Suffruticose perennial herbs to 1 m high. Midstems with minute recurved arcuate hairs mostly 0.1-0.2 mm high. Corollas reportedly white or creamy-white. Calyx lobes triangular, similar to var. *lasiodonta* but completely void of long ciliate hairs. Nutlets brown, ovoid, glabrous, ca. 2.1 mm long, 0.6 mm wide.

REPRESENTATIVE SPECIMENS EXAMINED: U.S.A. TEXAS: (as arranged by county, west to east, beginning to the north): Val Verde Co.: *Cory 15234* (TEX). Medina Co.: *Barkley 13912* (TEX); *Johnston et al. 3423* (TEX).

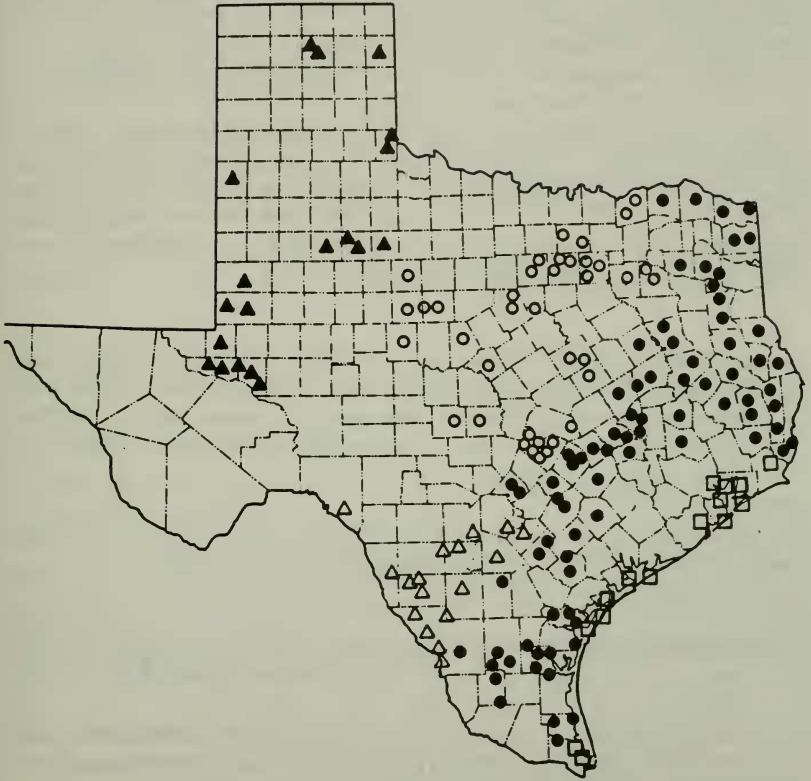


Figure 7. Distribution in Texas of *Monarda punctata* var. *correllii* (open triangles); var. *intermedia* (open circles); var. *lasiodonta* (closed circles); var. *occidentalis* (closed triangles); and var. *punctata* (open squares).

Bexar Co.: *Parks Rz 3132* (TEX). Maverick Co.: *Johnston et al. 3596* (TEX). Frio Co.: *Drews 29* (TEX); *Chavez 105* (LL); *Higdon 53-57* (TEX); *Tharp s.n.* (TEX). Wilson Co.: *Tejada s.n.* (TEX). Webb Co.: *Bruni 2* (LL); *Garcia 25* (TEX); *Perez 101* (TEX); *Ramírez 53* (TEX); *Rodríguez 82* (TEX). Atascosa Co.: *Fryzell 1296* (TEX). Karnes Co.: *Johnson 821* (TEX). Goliad Co.: *Williams 129* (TEX). Dimmit Co.: *Correll 20920* (LL). La Salle Co.: *Tharp 3712* (TEX). McMullen Co.: *Albers 49035* (TEX).

MEXICO. Tamaulipas: 6 mi S of Nuevo Laredo, *Barrera 149* (LL); 10 mi SE of Nuevo Laredo, *Rodríguez 84* (TEX).

This taxon is restricted to southcentral Texas and closely adjacent México. Previous workers have referred most of the plants which I have posited here to var. *coryi* (McClintock & Epling) Cory. I consider the latter to be a synonym of var. *lasiodonta*, which is readily distinguished from var. *correllii* by having pilose calyx lobes. The calyx lobes of var. *correllii* are quite similar to those of the coastal var. *punctata*, both lacking pilose hairs.

- 11c. *MONARDA PUNCTATA* L. var. *INTERMEDIA* (McClintock & Epling) Waterfall, *Rhodora* 52:38. 1950. BASIONYM: *Monarda punctata* L. subsp. *intermedia* McClintock & Epling, Univ. Calif. Publ. Bot. 20:184. 1942. TYPE: U.S.A. Texas: Van Zandt Co., near Wills Point, V.A. *Little 14456* (UC-UCLA!).

This taxon occurs in northcentral Texas (Figure 7), peripheral populations seemingly passing into var. *lasiodonta* in regions of near contact.

- 11d. *MONARDA PUNCTATA* L. var. *LASIODONTA* A. Gray, *Syn. Fl. N. Amer.* 2(1):375. 1878. BASIONYM: *Monarda lasiodonta* (A. Gray) Small, *Fl. S.E. U.S.* 1038, 1337. 1903. TYPE: U.S.A. Texas: w/o locality, 1834-35, *T. Drummond s.n.* (LECTOTYPE [selected by Scora 1967]: GH. Shinners (1953) has given a detailed account of the presumed lectotype, this not mentioned by Scora in his treatment.

Monarda punctata L. subsp. *immaculata* Pennell, Bull. Torrey Bot. Club 46:187. 1919. *Monarda punctata* L. var. *immaculata* (Pennell) Scora, Univ. Calif. Publ. Bot. 41:47. 1967. TYPE: U.S.A. Texas: Victoria Co., Aloe, 8 Sep 1913, *Pennell 5494* (HOLOTYPE: PH; Isotype: NY!).

This, the earliest described Texas variety, was treated by McClintock & Epling (1942) as a questionable synonym of subsp. *villicaulis* Pennell, a taxon not occurring in Texas as treated here. Both Shinners (1953) and Scora (1967)

recognized var. *lasiodonta* as a Texas endemic, although they both maintained var. *immaculata* as distinct, as do I.

- 11e. *MONARDA PUNCTATA* L. var. *OCCIDENTALIS* (Epling) Palmer & Steyermark, Ann. Missouri Bot. Gard. 22:634. 1935. BASIONYM: *Monarda punctata* L. subsp. *occidentalis* Epling, Madroño 3:25. 1935. TYPE: U.S.A. Oklahoma: Woods Co., Alva, Stevens 3072 (HOLOTYPE: NY!; Isotype: GH).

This variety occurs in northwestern Texas (Figure 7) and northwards and is relatively easily recognized, the more peripheral eastern populations showing little tendency to vary in the direction of its closest allopatric cohort, var. *intermedia*.

A single collection of this taxon has been examined from México, as follows: Chihuahua: near San Diego Hacienda, 25 Aug 1891, Hartman 790 (UC,US).

12. *MONARDA RUSSELLIANA* Nutt. ex Sims, Bot. Mag. 511, t.2513. 1824. TYPE: U.S.A. Arkansas: grown in London from seeds collected near Fort Smith, w/o date, Nuttall s.n. (HOLOTYPE: BM, according to McClintock & Epling 1942).

This species is closely related to *Monarda bradburiana* Beck, which has a more northerly distribution. According to Scora (1967) these two species show evidence of intergradation in Oklahoma and elsewhere. Correll & Johnston (1970) accredit *M. bradburiana* to Texas, largely on the basis of a single unvouchered collection from Kerr County, Texas reported by McClintock & Epling (1942). Scora (1967), however, does not report having seen collections of the latter from Texas, nor have I.

13. *MONARDA STANFIELDII* Small, Fl. S.E. U.S. 1038, 1337. 1903. *Monarda punctata* L. var. *stanfieldii* (Small) Cory, Rhodora 38:407. 1936. *Monarda punctata* L. subsp. *stanfieldii* (Small) Epling, Madroño 3:25. 1935. TYPE: U.S.A. Texas: Hays Co.(?), "near San Marcos", w/o date, S.W. Stanfield s.n. (HOLOTYPE: NY!).

Monarda stanfieldii is a well-marked taxon largely confined to the granitic sands along the middle course of the Colorado River (Figure 5). McClintock & Epling (1942) recognized the taxon as a subspecies of *M. punctata*, while both Shinnors (1953) and Scora (1967) accepted its varietal status. I have found no suggestion that it intergrades with any element of *M. punctata*, in spite of its sympatry with that species (mainly var. *lasiodonta*).

14. *MONARDA VIRIDISSIMA* Correll, *Wrightia* 9:76. 1968. TYPE: U.S.A. Texas: Bastrop Co., 2 mi E of Bastrop along route 21, 10 Sep 1968, D.S. Correll 36368 (HOLOTYPE: LL!; Isotypes: GH, TEX!, UC!, US!).

This taxon was described subsequent to Scora's (1967) taxonomic study. Scora included collections of the taxon in his concept of *Monarda punctata* var. *lasiodonta*.

Monarda viridissima is a fall-flowering taxon known by numerous collections, these largely confined to outcrops of Carrizo sands in central Texas (Figure 6) where it grows with or near *M. punctata* (e.g., Albers s.n., 23 Jun 1932, TEX, both taxa mounted on the same sheet) without signs of intergradation, although the occasional hybrid between these might be expected.

Correll & Johnston (1970) took *Monarda punctata* var. *immaculata* to be a synonym of *M. viridissima*, but examination of the type of the former (from Goliad Co., Texas) shows it to be synonymous with *M. p.* var. *lasiodonta*, which was recognized by Correll & Johnston.

I visited the type locality of *Monarda viridissima* in early September of 1994 and could not find individuals of the taxon (the once single lane road now transformed into a 4-lane highway). However, at a site ca. 1/2 mi west of the type locality (along County Road 118 west off of Highway 21), I located a small population of 30-40 plants of *M. viridissima*. The individuals were well-scattered and just coming into flower (Turner 94-114). All of the plants were essentially alike as to leaf shape, size, and vestiture. No plants of *M. punctata* were found growing anywhere in the vicinity of the population concerned.

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